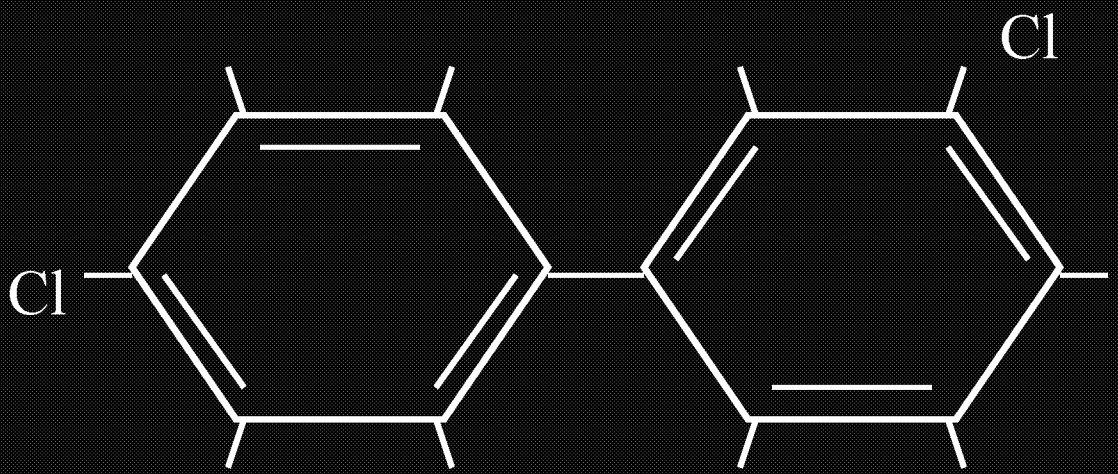
PCBs and TSCA



- Kim Tisa, PCB Coordinator
- US EPA Region 1

PCBs in Industrial Applications

- Transformers
- Capacitors
- Hydraulic fluids
- Oil-based paints
- Fluorescent light ballasts
- Lubricating & cutting oils
- Floor finishes
- Fire retardants
- Thermal Insulation materials (foam, felt)
- Caulking & grout
- PVC coatings for electrical wire & components
- Carbonless copy paper
- Inks and dyes
- Adhesives/mastic

Uses of Aroclor by Type

Current Uses (since 1970)	1221	1232	1242	1248	1254	1260	1268
Capacitors	X		X		X		
Transformers			X			X	
Heat transfer			X				
Hydraulic/lubricants • Hydraulic fluids		X	X	X	X	X	
• Vacuum pumps				X	X		
• Gas-transmission turbines	X		X				
Plasticizers • Rubbers	X	X	X	X	X		X
• Synthetic resins				X	X	X	X
• Carbonless paper	X		X				
Miscellaneous • Adhesives	X	X	X	X	X		X
• Wax extenders			X		X		
• Dedusting agents					X		
• Inks					X	X	
• Cutting oils					X		
• Pesticide extenders					X		
• Sealants and caulking compounds					X		

PCB Trade Names

Generic Name Askarel			
TRADE NAME	USER	TRADE NAME	USER
ALC	Uptegraff	Aroclor	Monsanto
Asbestol	American	ASK	Queensboro
Capacitor 21	Monsanto	Chlorextol	Allis-Chalmers
Chlorinol/Clorinol	Sprague Electric	Clophen	Bayer
Diaclor	Sangamo Electric	Dykanol	Cornell Dubilier
EEC-18	Niagra	EEC-18	Power Zone
Elemex	McGraw Edison	Eucarel	Electrical Util. Corp.
Hyvol	Aerovox	Inclor	Caffaro
Inerteen	Westinghouse	Magvar	General Electric
MCS 1489	Monsanto	Non-Flammable Liquid	ITE
No-Flamol	Wagner	Pydraul	Monsanto
Pyranol	General Electric	Pyroclor	Monsanto
Saf-T-Kuhl	Kuhlman Electric	Santotherm	Monsanto
Santovac 1 & 2	Monsanto	Therminol	Monsanto

The Demise Begins

- In 1976, over concerns about the toxicity and persistence in the environment of PCBs, Congress enacted Section 6(e) of the Toxic Substances Control Act (TSCA)

- In 1979, PCBs were banned for all uses except “totally enclosed uses”, such as transformers, capacitors, vacuum pumps and hydraulic fluids

- In 1998, PCB Disposal Amendments

Where does that leave us today?

- The TSCA PCB regulations (40 CFR Part 761) place prohibitions on the use (manufacture), processing, and distribution in commerce and specify storage and disposal requirements for PCBs and PCB items
- PCB regulations may govern owners, operators, and/or persons conducting cleanup of PCB-contaminated property where the PCB contamination exceeds allowable concentrations under the regulations
- TSCA authority is not delegated to the states; therefore both TSCA and state regulations will apply

Where does that leave us today?

- Regs allow materials that have been decontaminated to be:

  - ✓ Distributed in commerce under 761.20(c)(5)
  - ✓ Used or reused under 761.30(u)
  - ✓ Disposed of as non-TSCA regulated (with certain exclusions)

APPLICABILITY 761.1(b)(5)

CANNOT AVOID A PROVISION BY DILUTION, UNLESS SPECIFICALLY ALLOWED

PROJECT CONSIDERATIONS

- Do I need to look for PCBs
- If I find PCBs, is my site regulated under TSCA
- What are my cleanup options

PCBs in Industrial Applications

- Transformers
- Capacitors
- Hydraulic fluids
- Oil-based paints
- Fluorescent light ballasts
- Lubricating & cutting oils
- Floor finishes
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- Caulking & grout
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- Inks and dyes
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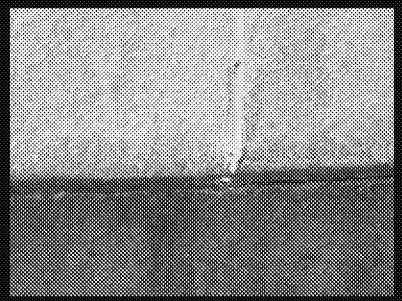
PCB USES – CAULKS & LIGHT BALLASTS



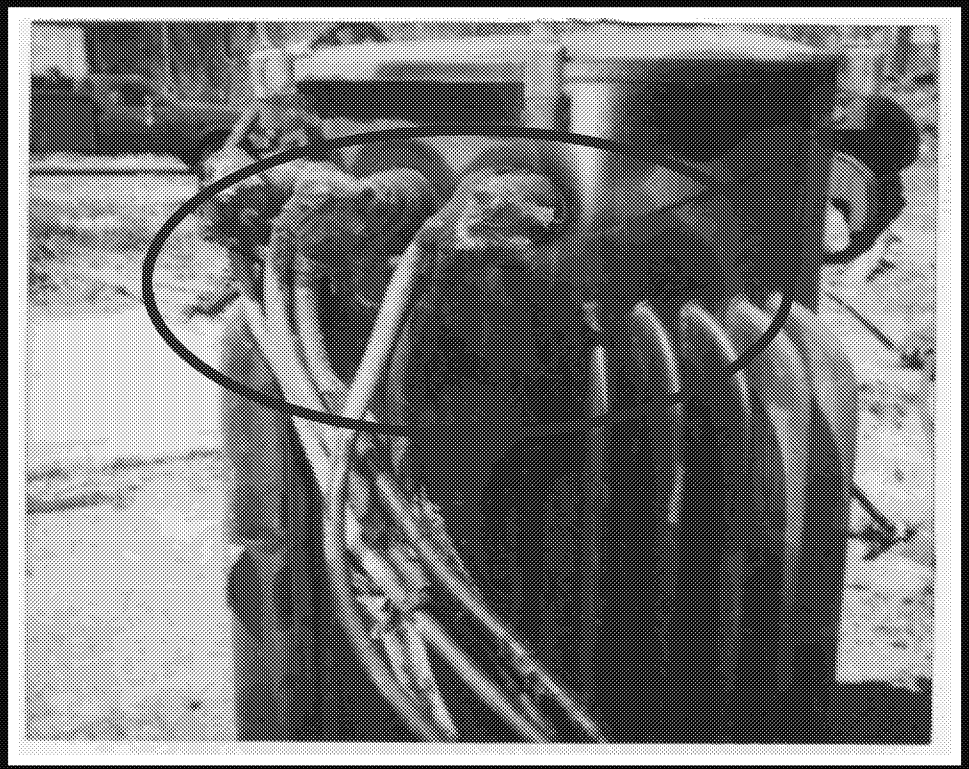
U.S. Production of Aroclors as a plasticizer ingredient (mostly Aroclor 1254)

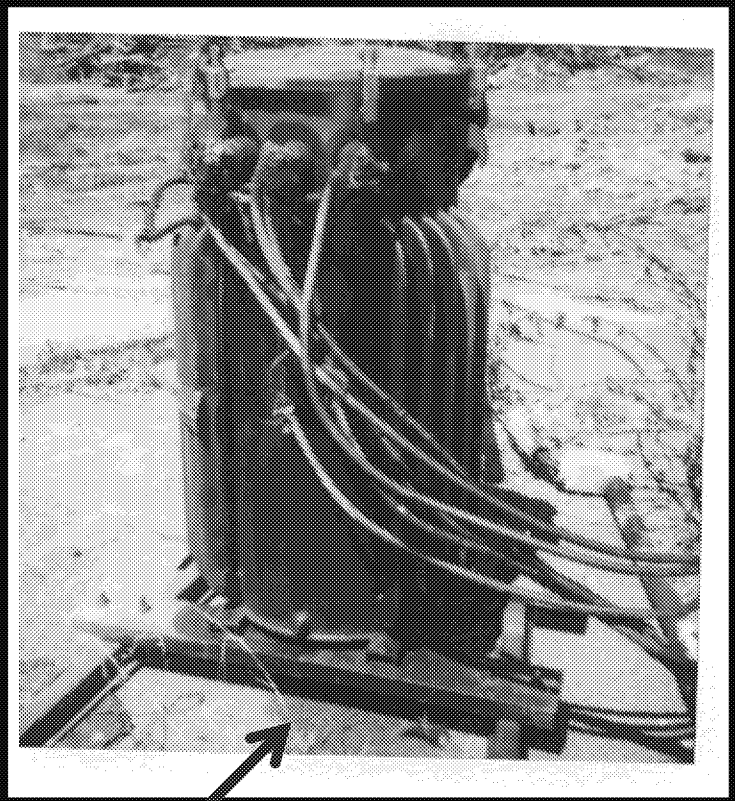
- 1958 - 4 million pounds
- 1969 - 19 million pounds
- 1971 - 0 pounds produced in U.S. (imports?)

Fluorescent light ballast capacitors (mostly Aroclor 1242)

- Prior to 1977 - Many (most?) ballasts contain PCBs
- 1977 – 1978 - Some new ballasts contain PCBs
- After 1978 - No new ballasts manufactured w/PCBs
- Some ballasts remain in place; some have leaked/failed

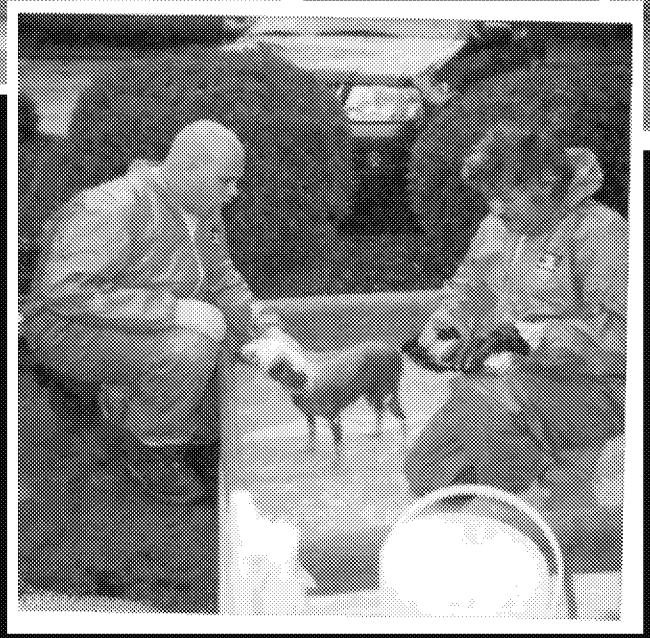
Office of Research & Development
National Exposure Research Laboratory





- Transformer Spill and Weepage

November 2006



Spill from a pole-top transformer

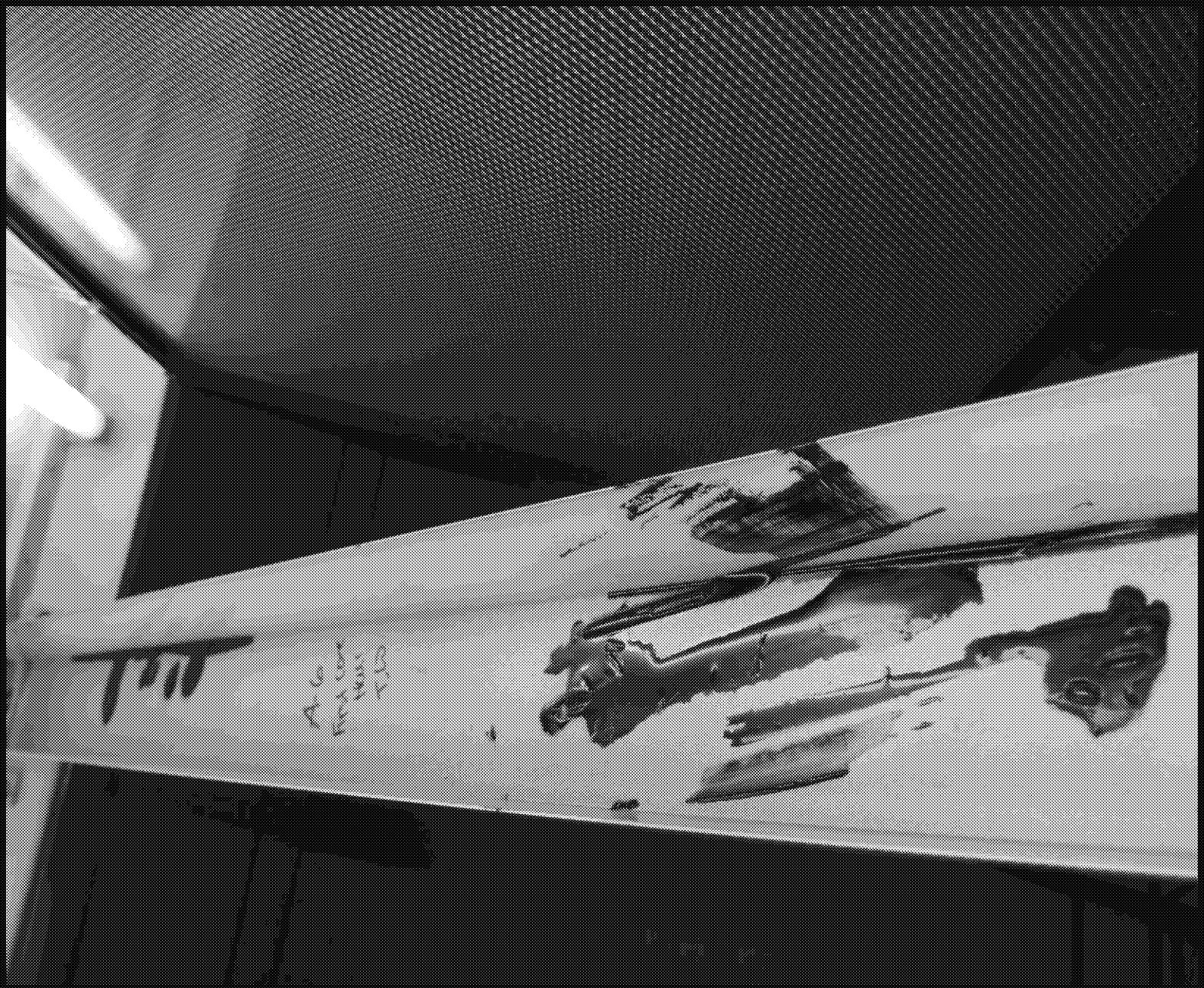
- Bank closed 4 days
- 4 dogs decontaminated
- ~ $150,000 cleanup cost

In fluorescent light ballasts

- PCB Small Capacitor of the type that can be found in clock systems. Trade Name is indicative of PCB content as well as the absence of the statement "No PCBs"

- Small Capacitor which does not contain PCBs of the type that can be found in clock systems. Marking "No PCBs" indicates that it was manufactured without PCBs.

2nd
Blue
49



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PCB Capacitor	PCB Potting Material	Labeling, Transportation and Manifesting for Disposal	Disposal Reference in §761	Disposal Options
"No PCBs" label		Not regulated under TSCA	N/A	Not regulated under TSCA
None	< 50 ppm	Not regulated under TSCA	N/A	Not regulated under TSCA
Intact and non-leaking or none	≥ 50 ppm	Is a PCB bulk product waste. No labeling is required. Manifesting is required for disposal in accordance with §761.62(a); is not required under §761.62(b); may be required under §761.62(c).	.50(b)(2)(ii) .62(a)-(c)	TSCA Incinerator, TSCA/RCRA Landfill, Alternate Destruction Method, Decontamination (§761.65(d) storage approval may be required), Coordinated approval, State approved landfill (leach test required), Risk-based approval
Intact and non-leaking	< 50 ppm	No labeling or manifesting required	.50(b)(2)(i) .60(b)(2)(ii)	As municipal solid waste 40 CFR 761 subpart D options
Leaking	< 50 ppm or ≥ 50 ppm	Disposal as PCB bulk product waste. No labeling is required. Manifesting is required for disposal in accordance with §761.62(a); may be required under §761.62(c).	.62(a) or (c)	TSCA Incinerator TSCA/RCRA Landfill Alternate Destruction Method Decontamination (§761.65(d) storage approval may be required) Coordinated approval Risk-based approval

PCB Remediation Waste § 761.3

- *Waste containing PCBs as a result of a spill, release or other unauthorized disposal if*:
  - Disposed prior to April 18, 1978 and is currently at ≥ 50 ppm
  - Original PCB source ≥ 500 ppm beginning on April 18, 1978 and currently any concentration (≥ 1 ppm)
  - Original PCB source ≥ 50 ppm beginning on July 2, 1979 and currently any concentration (≥ 1 ppm)
  - Any concentration if from an unauthorized source

** Burden of Proof and Presumption of no unreasonable risk § 761.50(b)(3)

PCB Bulk Product Waste

Definition at § 761.3

" Waste derived from manufactured products containing PCBs in a non-liquid state, at any concentration where the concentration at the time of designation for disposal was ≥ 50 ppm PCBs"

SUBPART D. APPLICABILITY – § 761.50

- Primary Function – Roadmap to Subpart D Storage and Disposal Requirements

SUBPART D. APPLICABILITY – § 761.50(a)

- 761.50(a)(2) – prohibits processing of liquids into non-liquids
- 761.50(a)(4) – spills constitute disposal

PCB Remediation Waste - § 761.50(b)(3)

- Pre-April 18, 1978 Disposal **
  - Presumed not to pose a risk & no cleanup requirements
  - RA must make an unreasonable risk finding to require further action
  - Voluntary cleanup unregulated, dispose of waste according to 761.61

Owner of the waste must prove the disposal date*

PCB Remediation Waste - § 761.50(b)(3)

- Post-April 18, 1978 disposal
  - PCB Spill Cleanup Policy, where applicable
  - Cleanup under 761.61
  - Enforcement still possible for unauthorized disposal

ISSUES

- Manufactured products containing PCBs have been found in many buildings and structures
- Caulk typically contains PCBs at very high levels - %
- The PCBs in the caulk (or other non-liquid product) can migrate to surrounding materials (air, soil, masonry).
- Typical renovation procedures can increase exposures to workers and building residents, including children.
- The use of PCBs in non-liquid manufactured building products at >/= 50 ppm is prohibited under TSCA.

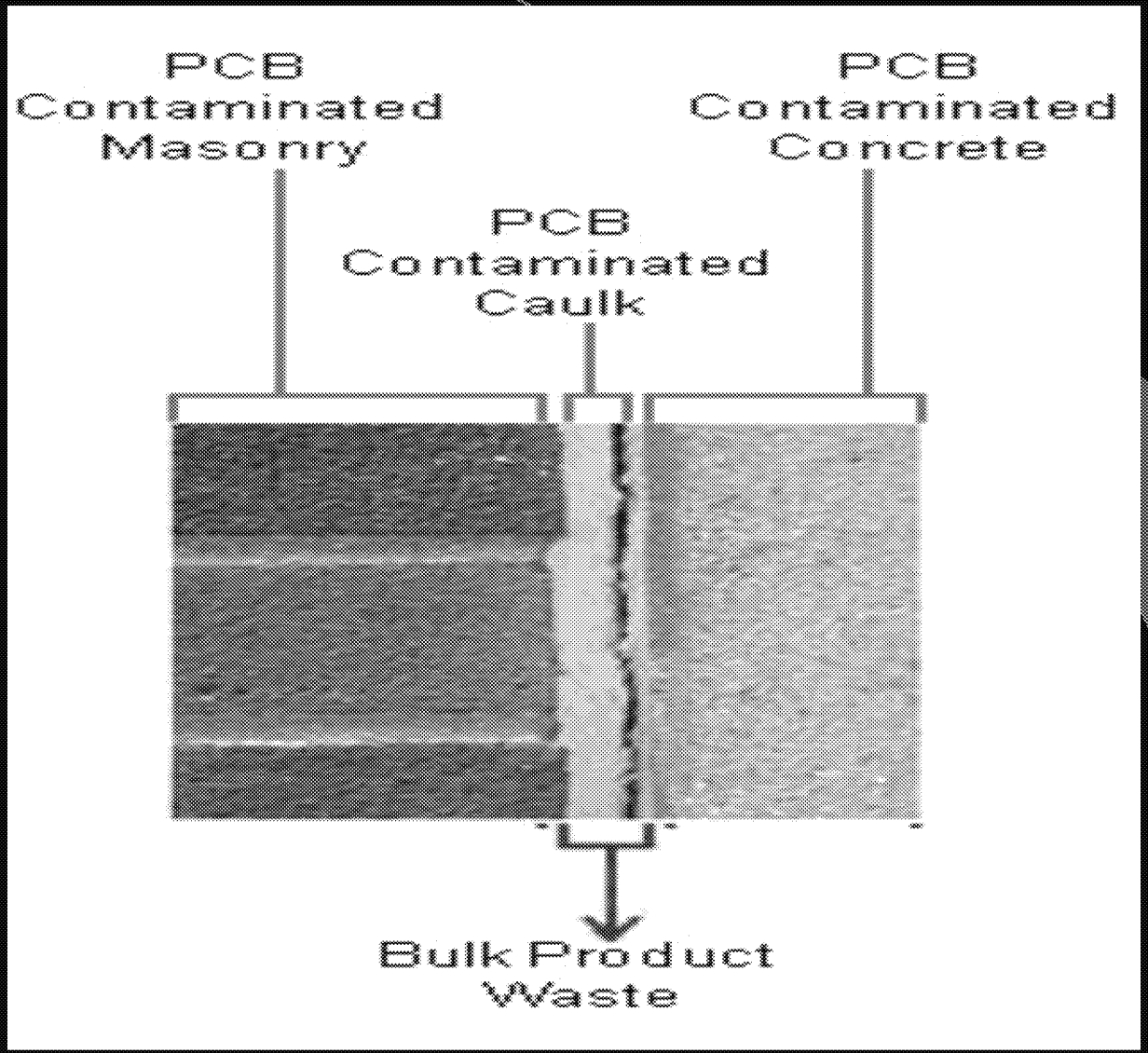
PCB Bulk Product Waste - § 761.62

- Performance-Based (761.62(a))
  - Incineration; TSCA or RCRA C Landfill; AMDA; Decon, etc.
- Solid Waste Landfill (761.62(b))
  - Allows dispose of certain materials into state landfills
  - Requires leach test for non-specified waste
  - Notification to landfill required
  - Subparts C and K not applicable
- Risk-Based (761.62(c))
  - Requires RA approval

REGULATORY CONSIDERATIONS

- Management in place not acceptable for *PCB bulk product waste* (§ 761.62)
- May be acceptable for surrounding materials (§ 761.61)
- *Possible* short-term interim measure
  - Consultation with EPA
  - Sampling may be required
- Bulk Product Waste Reinterpretation

Bulk Product Waste Reinterpretation



Source Removal
PCB Bulk Product Waste

- Caulk removal
  - Strip out
- Paint removal
  - Abrasives
  - Chemicals
  - Hydroblast

** § 761.62**

Adjacent Surfaces and Surrounds
PCB Remediation Waste

- Grind/cut out areas of visual "source material" classified as *PCB bulk product waste*
- Apply § 761.61 options, as appropriate, to remaining substrates
- Soils are PCB remediation waste if > 1 ppm PCBs

Cleanup of *PCB Remediation Waste* – § 761.61

- Three options for Site cleanup and/or disposal
  - Self-implementing Approach
  - Performance-Based Approach
  - Risk-based Approach

Self-implementing Approach (SIP) § 761.61(a)

- Most appropriate for small-moderate sized sites (< 1-acre)
- Notification/Certification requirements with USEPA, states, and local environmental agencies
  - 30-day default timeframe not applicable unless SIP requirements are followed in their entirety
- Prescriptive procedures for sampling and cleanup
  - Cleanup and Disposal depends upon waste type and location of disposal
  - Requires compliance with all sampling and analytical procedures
  - *In Situ* ("as found") sampling with no compositing for characterization
  - Characterization and verification sampling

Self Implementing Exclusions

- Specifically excludes the following types of sites:
  - Surface and/or ground waters
  - Sediments
  - Sewers or sewage treatment systems
  - Private/public drinking waters
  - Grazing lands
  - Vegetable gardens

PCB Cleanup Levels § 761.61(a)(4)
(bulk *PCB Remediation Waste/Porous Surfaces)*

- High Occupancy (> 6.7 hrs/week avg.)
  - ≤ 1 ppm
  - ≤ 10 ppm w/ compliant cap*
- Low Occupancy (<6.7 hrs/week avg.)
  - ≤ 25 ppm
  - ≤ 50 ppm with fence and sign
  - < 100 ppm w/ cap*

* Cap: minimum 10” compacted soil, or minimum 6” asphalt or concrete

PCB Cleanup Levels § 761.61(a)(4)
(*Non-Porous Surfaces*)

- High Occupancy (> 16.8 hrs/week avg.)
  - ≤ 10 ug/100 cm^2
- Low Occupancy (<16.8 hrs/week avg.)
  - < 100 ug/100 cm^2

PCB Remediation Waste Verification Sampling § 761.61(a)(6)

- Detailed and prescriptive methods for:

  - Sample extraction and analyses
  - Number of samples, depths, and locations
  - Reporting
  - Subpart O (bulk and *porous surfaces***)
  - Subpart P (*non-porous*)
  - Compositing provided adequate delineation

**May 2011 Region 1 SOP for *porous surfaces*

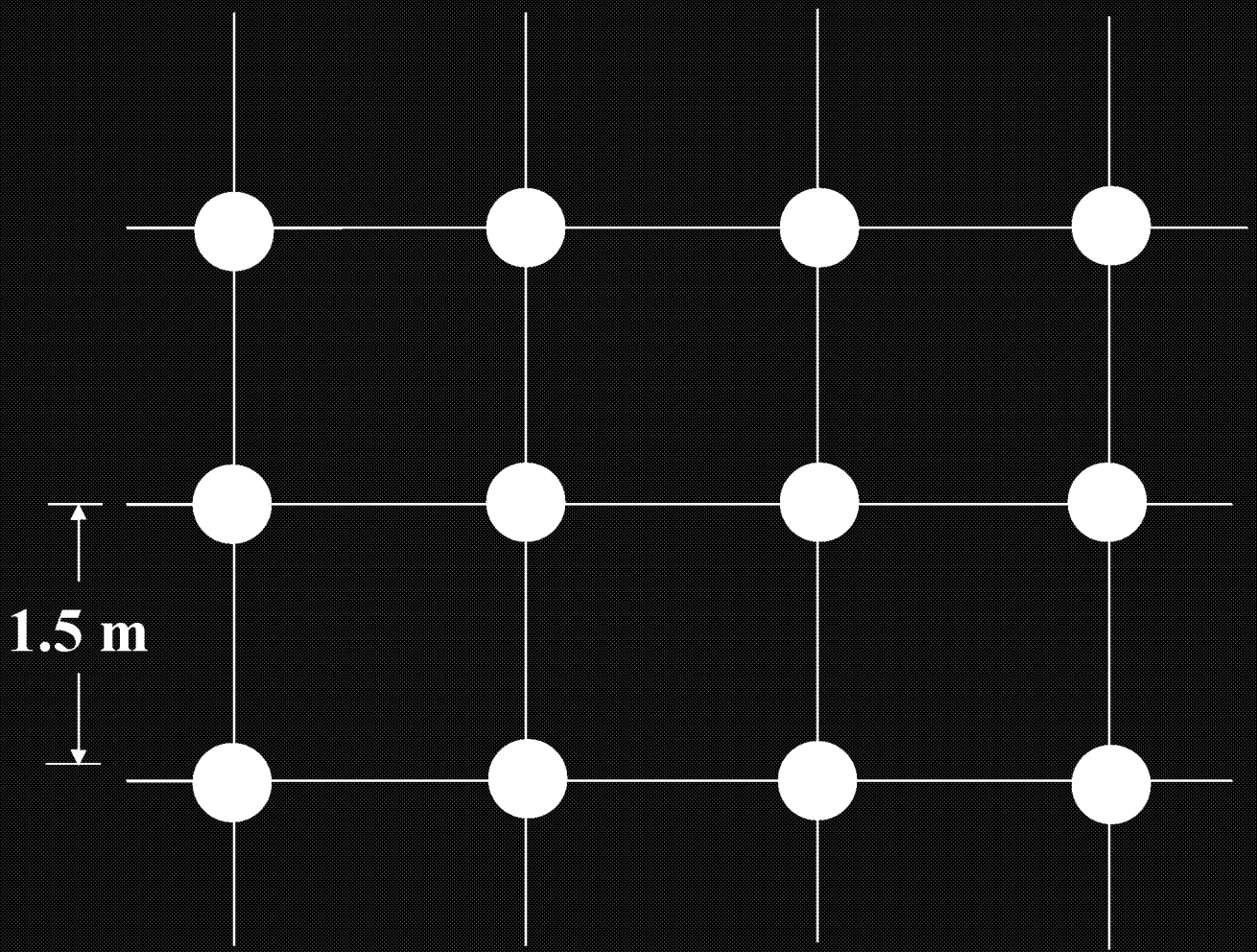
PCB Remediation Waste Verification Sampling § 761.61(a)(6)

- Field screening methods may be used in a dynamic sampling approach for initial verification
- Subpart O final verification sampling uses a 5’ x 5’ sampling grid over remediated area (minimum 3 samples) and definitive laboratory analysis methods but may use Subpart Q
- Cleanup continues until established cleanup levels are reached

Subpart O -Composite Sampling

- Allowed provided adequate characterization
- Consider whether point-source or non-point source
- 9-sample max per composite

Mark Sampling Points at Intersection of Grid Lines

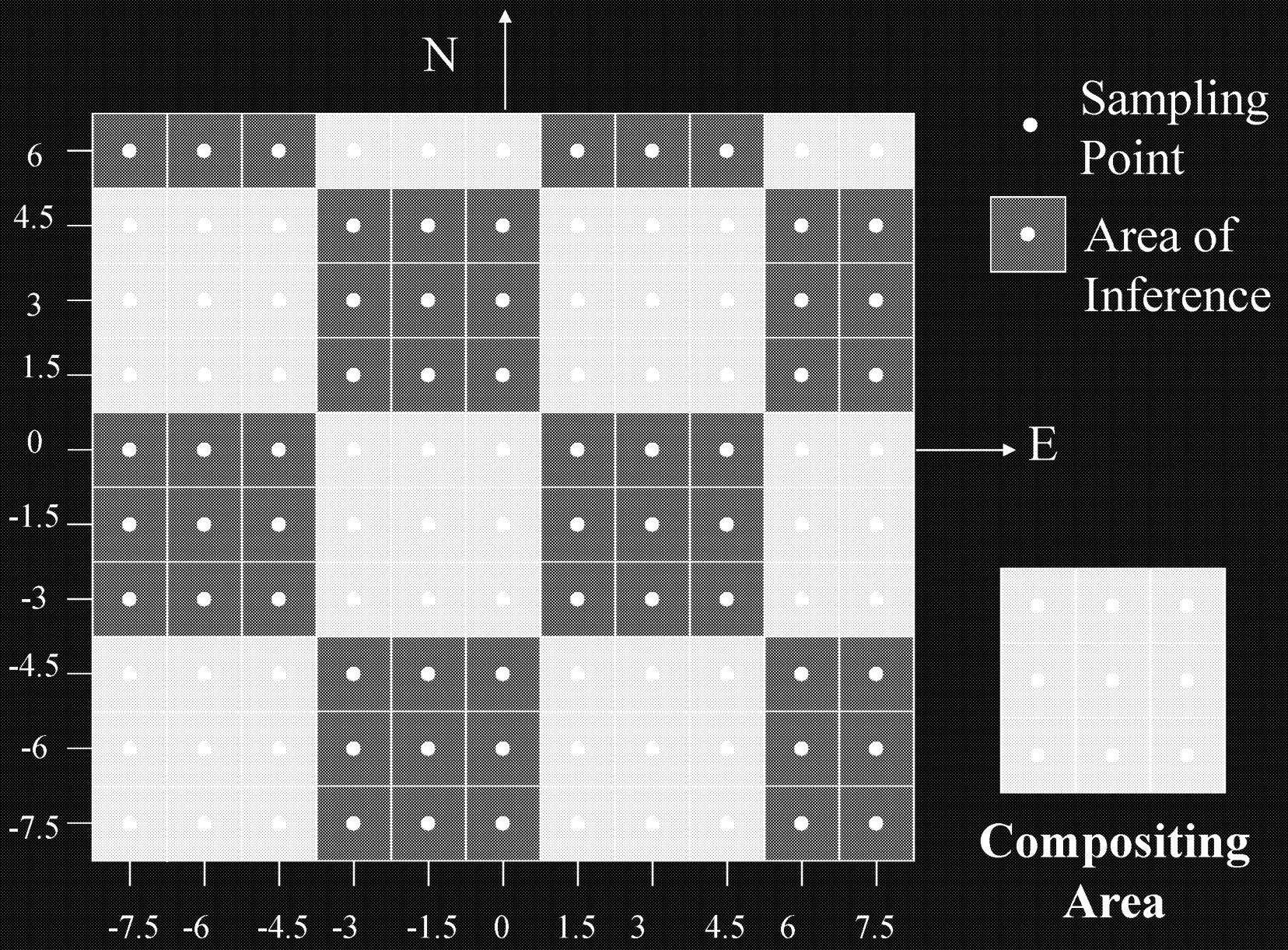


Sampling Point

8/5/98 Preamble page 35409

Codified 63 FR 35465

Compositing Areas: Non-point Source



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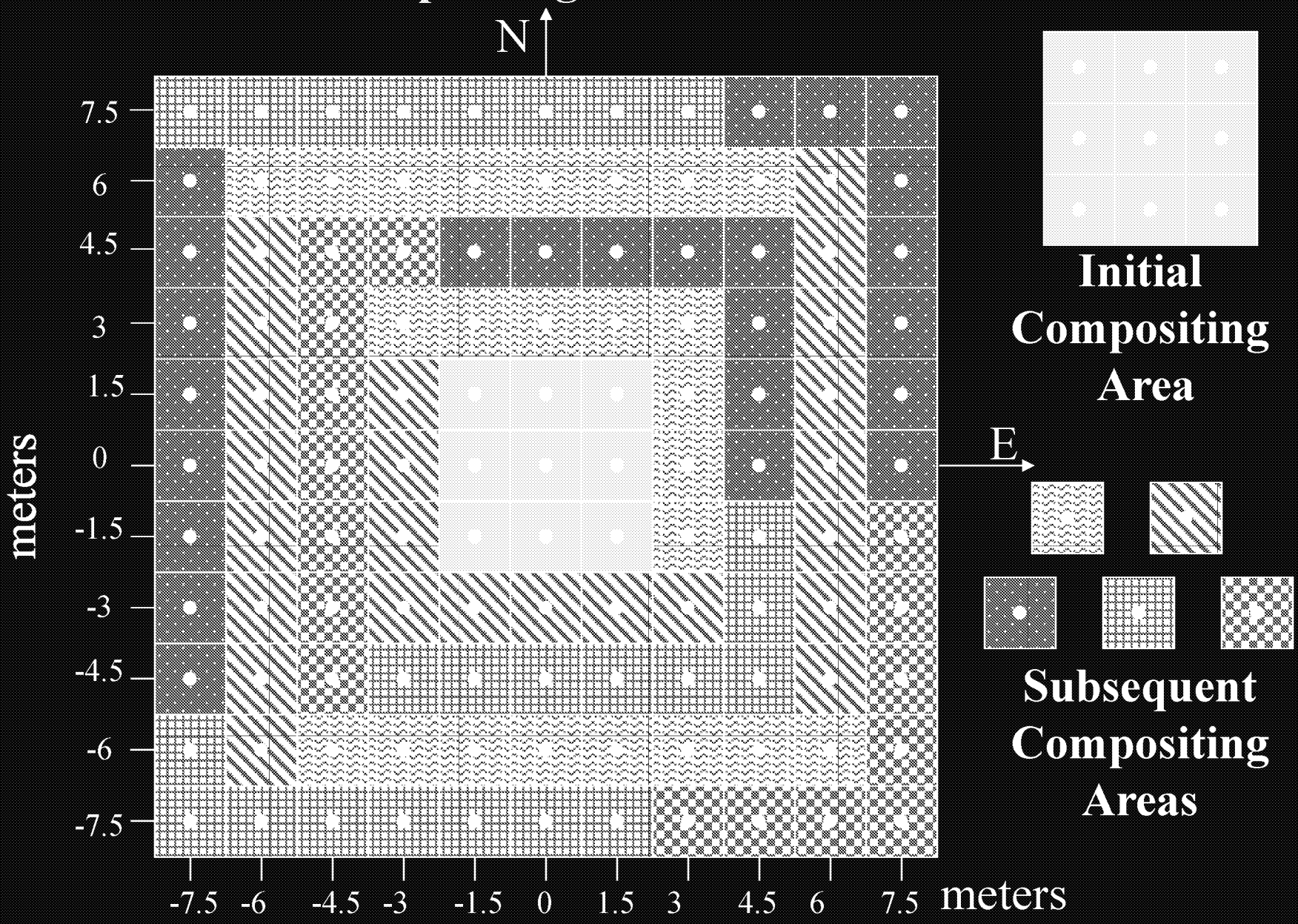
Codified 63 FR 35466

Compositing Areas: Point Source



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Codified 63 FR 35466

PCB Remediation Waste Disposal - § 761.61(a)(5)

- Liquids § 761.60(a)
- ≥ 50 ppm (dewatered waste)
  - Existing TSCA Facilities
  - RCRA §3004 or §3006 hazardous waste landfill
- < 50 ppm (dewatered waste and provided adequate characterization)
  - Existing TSCA Facilities
  - RCRA §3004 or §3006 hazardous waste landfill
  - State approved solid waste landfill

TYPE OF WASTE	Cleanup Levels (a)(4) for Leaving Waste On- site	Disposal Options On-site	Off-site
Bulk PCB Remediation Waste and Porous Surfaces	H.O.A. <1 ppm <10 ppm with cap L.O.A. <25 ppm <50 ppm with Mark and fence <100 ppm with cap	On-site land disposal Soil Washing TSCA Incineration §761.60(e) ADM* Risk-based approval Dewatering	TSCA Incineration TSCA/RCRA landfill §761.60(e) Alternate Destruction Method Risk-based approval State approved landfill** (if <50ppm)
Non-Porous Surfaces	H.O.A. ≤10 μg/100 cm² L.O.A. <100 μg/100 cm²	On-site land disposal TSCA Incineration §761.60(e) ADM* Risk-based approval Decontamination (measurement-based or performance -based)	TSCA Incineration TSCA/RCRA landfill §761.60(e) ADM* Risk-based approval State approved landfill** (if <100 μg/100 Scrap metal recovery oven (if <100 μg/10 Scrap metal recovery oven plus smelter (if ≥100 μg/100 cm²)
Liquids	Water <0.5 ppb no restrictions < 3 ppb or discharge limits for treatment works or navigable waters §307(b) or §402 permit limit <200 ppb for totally enclosed recycled uses Other <2 ppm	TSCA incineration §761.60(e) ADM* Risk-based approval Discharge to Treatment Works Discharge to §307(b) or §402 permit Decontaminate	TSCA incineration §761.60(e) ADM* Risk-based approval Discharge to Treatment Works Discharge to §307(b) or §402 permit Decontaminate
Non-Liquid Cleanup Equipment	N/A	TSCA incineration §761.60(e) ADM* Risk-based approval Decontaminate	Same options as for off-site bulk remediati waste Decontaminate

*Alternate destruction method approved under §761.60(e)

** A facility permitted, licensed, or registered by a State to manage municipal solid waste subject to 40 CFR 258 or non-municipal non-hazardous wast 40 CFR 257.5 through 257.30, as applicable

Comparison of Cleanup under the PCB Spill Cleanup Policy and the Self-Implementing Cleanup of PCB Remediation Waste for this Example.

Qualifications and Conditions	Spill Cleanup Policy	Self-Implementing Disposal
When can the spill have occurred?	Fresh spills	No restriction
When must cleanup begin?	Within 24/48 hours of the spill.	No limit.
Site size restrictions	Approximately 20 feet in diameter.	None, designed for moderate sized sites (less than one acre).
Notification to EPA required?	If greater than 10 pounds of PCBs spilled, yes, if not no.	Always, regardless of the amount of PCB.
Cleanup levels	Depends on where the spill is and the kind of material (soil or impervious surface).	Depends on where the spill is and the kind of material (bulk PCB remediation waste/porous surface, non-porous surface, or liquid).
Post-Cleanup Verification Sampling	Triangular grid, maximum number of samples is 40, options for other procedures.	Square-based grid, no limit on number of samples, options for other procedures.
Penalty for spill?	No	Possible
Disposal of cleanup wastes	Based on the concentration of the original spilled material.	Based on the concentration of the waste as found.

§ 761.30(p) – Continued use authorization for PCB *porous surfaces*

Allows PCB-contaminated *porous surface* from PCB spill to be used for the remainder of its useful life if:

- ✓ Contamination source removed;
- ✓ Double wash rinse;
- ✓ Surface cover with coating and/or solid barrier; and
- ✓ Surface PCB M_L marked

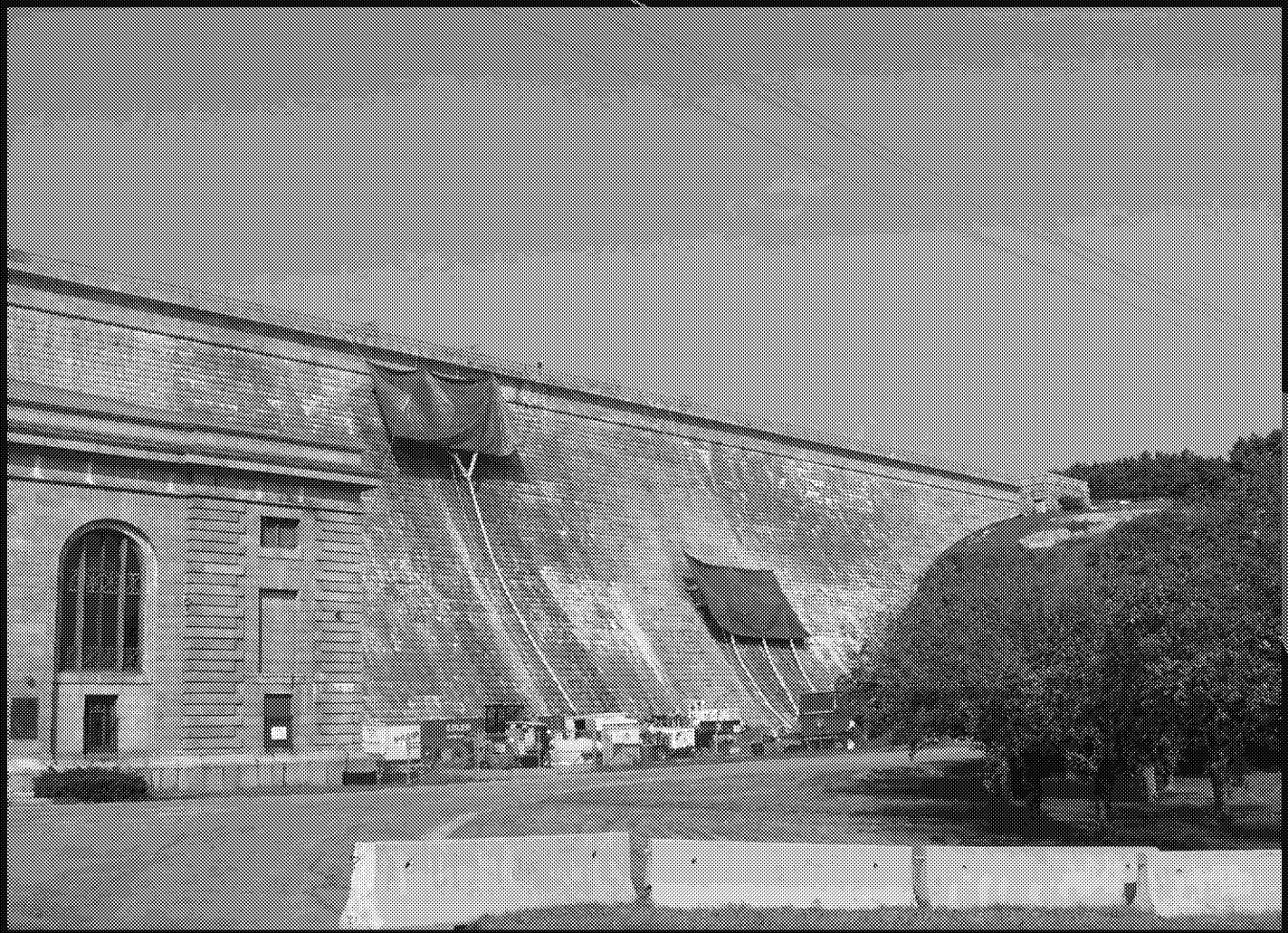
Risk Based Disposal Option - § 761.61(c)

- Deviation from decontamination, storage, and disposal requirements under 761.61(a)
- Recommended for complex or large sites and all media types
- Requires EPA approval
- Public notification process may be required
- Risk Assessment: state vs. federal
- Possible Long-Term O&M / Financial Assurance

EPA Public Health Levels for School Indoor Air

Age group	Public Health Level (ng/m^3)	Total Background Exposure (ng/kg-day)
Daycare/Pre-School	70 to 100	12 to 14
Elementary	300	6
Middle School	450	5
High School	600	4
Adult Staff	450	3

- Factor in "background" exposure to PCBs so a 20 ng/kg-day ("safe" level) of exposure is unlikely to be exceeded considering total PCB exposure
- Assumes that PCB dust concentrations inside school are at "background" levels
- Site-specific information can be used to "refine" Public Health Levels



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Performance Based Disposal Option - § 761.61(b)

- Notification not required to perform removal work
- Cleanup to less than 1 mg/kg total PCBs - Subpart O
- Dispose of all waste at TSCA-approved facility
- Document cleanup and keep records on file
- Recommended: § 761.61(a) or § 761.61(c) Notification to EPA

Excluded PCB Products

- Must meet all criteria under § 761.3
  - ✓ concentration
  - ✓ sold/distributed in commerce prior to 1984
  - ✓ no dilution
- May be left in place without further restrictions/requirements
- State Requirements may require removal

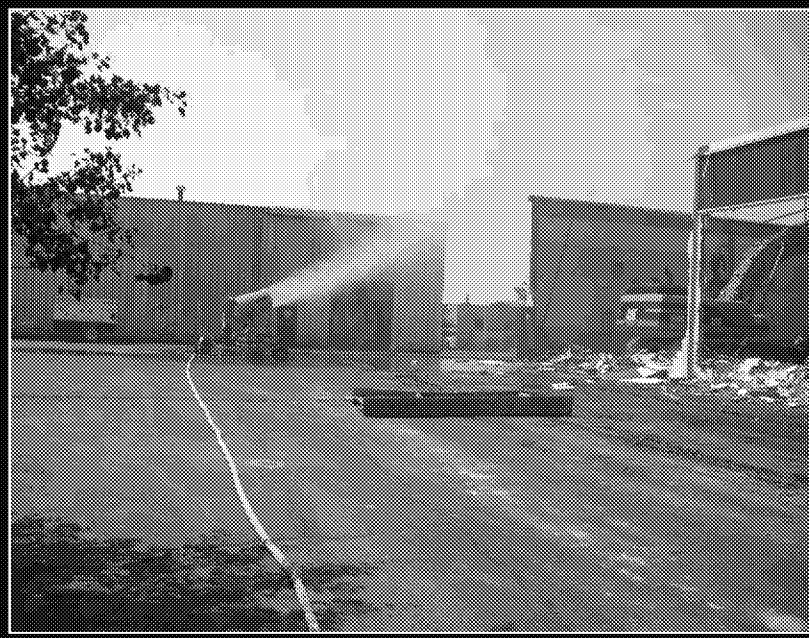
Decontamination - § 761.79

- Regulatory Provisions
  - *Establishes specific decon standards and procedures for removal of PCBs from:*
    - ✓ Water
    - ✓ *Non-porous surfaces*
    - ✓ Organic liquids
    - ✓ Concrete
    - ✓ *Non-porous surfaces* covered with a *porous surface*
  - *Alternative Decontamination 761.79(h)*

Which PCB cleanup option is best for my site?

Consider:

- Schedule
- Site size and End Use
- Contamination type and extent
- Special removal requirements
- Verification sampling
- Public involvement & LT requirements



Other Project Considerations

- Excavation/Decon set-up
- Storage limitations (lined roll-offs, containment areas, time restrictions)
- Transportation requirements (vehicles, manifests, PCB activity notification)
- Field Screening and Laboratory TAT
- Waste management / disposal
- Other federal/state/local permits/certs

PCB Project Dos and Don'ts

- DO:
  - Know your Site
  - Delineate nature/extent
  - Appropriate and Representative Sampling
  - Appropriate analytical data
  - Contractor Plans consistent with remediation
  - Consider waste management/storage requirements
  - Count on the unexpected

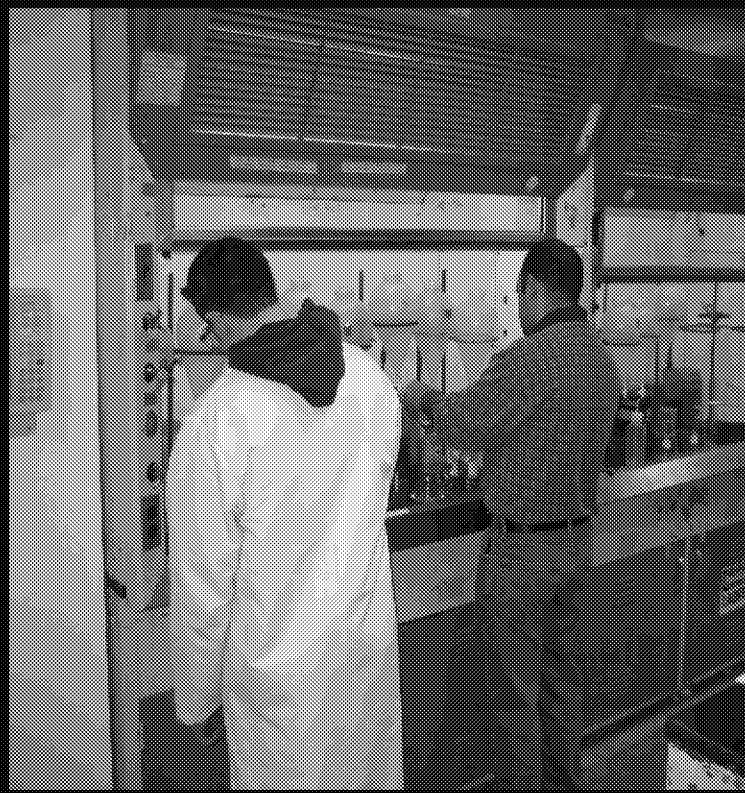
PCB Project Dos and Don'ts

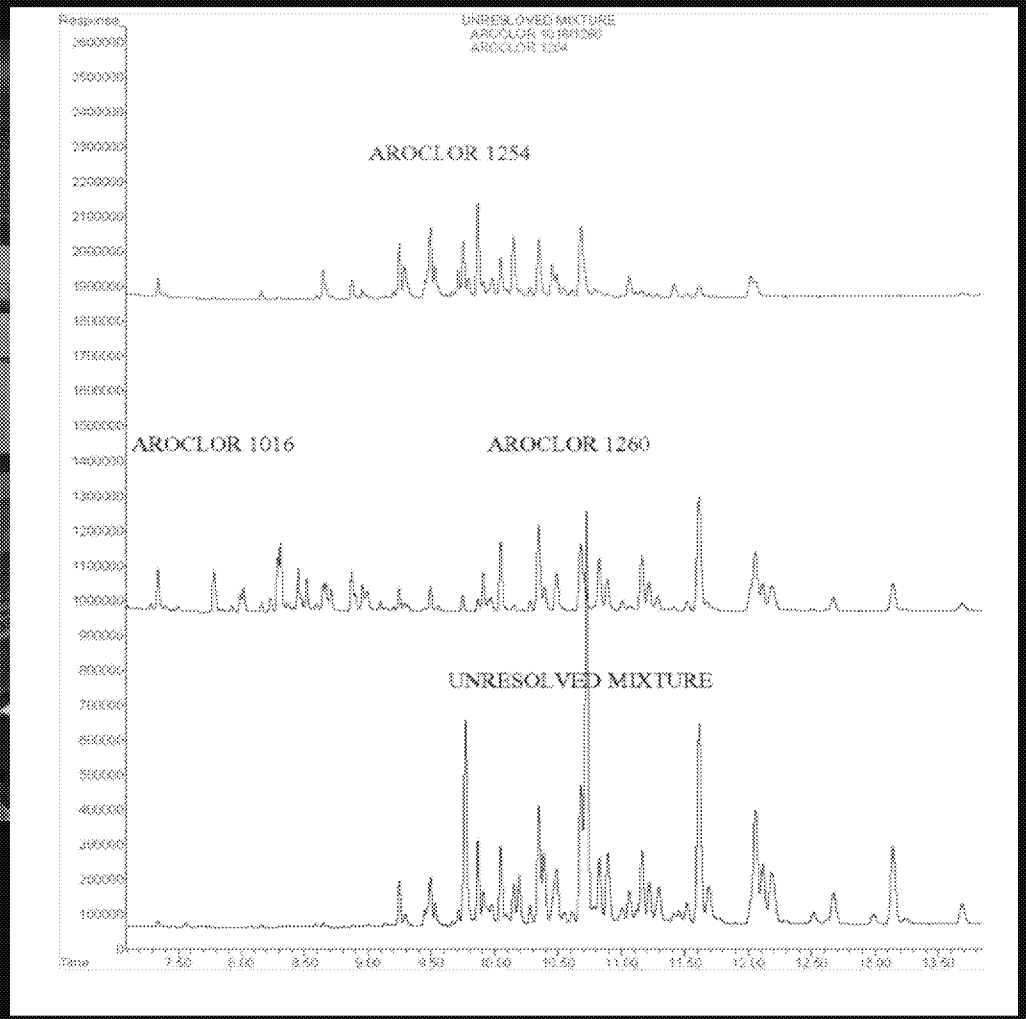
- DON'T:

  - Forget your Lab
  - Mishandle Waste
  - Re-contaminate cleaned areas
  - Improperly Decontaminate
  - Collect Samples while still conducting cleaning

  - Time delays
  - $$$

ANALYTICAL CONSIDERATIONS AND PITFALLS





LAB COMMUNICATION ISSUES

- Discuss Project Requirements

  - Methods
    - Allowable extraction methods – Soxhlet extraction (3540) preferred
    - Extraction by sonication not preferred
      - Inefficient
      - Not applicable to all matrices
      - Not allowed under many state QA programs
    - Analytical – 8082 for Aroclor or congener/homologue method
    - Alternative techniques require correlation study
      - Subpart Q

  - Reporting limits

Some Pros and Cons of the Analytical Methods

Method	Pro	Con
Aroclors (8082A)	▪ Relatively inexpensive (<$100/sample) ▪ Widely available analytical service	▪ Affected by weathering ▪ Although still used, it is not the best for air sampling
Homologs	▪ Good estimate of total PCBs ▪ Overcomes weathering of Aroclors ▪ Good option for air analysis (Aroclors may not evaporate as tech. mixtures) ▪ More accurate-no human interpretation	▪ Expensive (~$300/sample) ▪ A service not offered by all laboratories
Congeners	▪ Provides a breakout of all the individual PCB chemicals present ▪ Provides quantitation of the dioxin-like congeners ▪ Provides added flexibility in a risk assessment. More accurate (not dependent on human interpretation)	▪ Expensive (~$800/sample) ▪ Few laboratories offer the analysis (less than with homologs) ▪ Not all of the laboratories do it well (engage your QC chemist)
Screening kits (various)	▪ Cheap ▪ May help with faster delineation	▪ Subject to interferences ▪ Generally higher detection limits ▪ Not determinative ▪ No standing under the CAM in Massachusetts ▪ Not an option for risk assessment

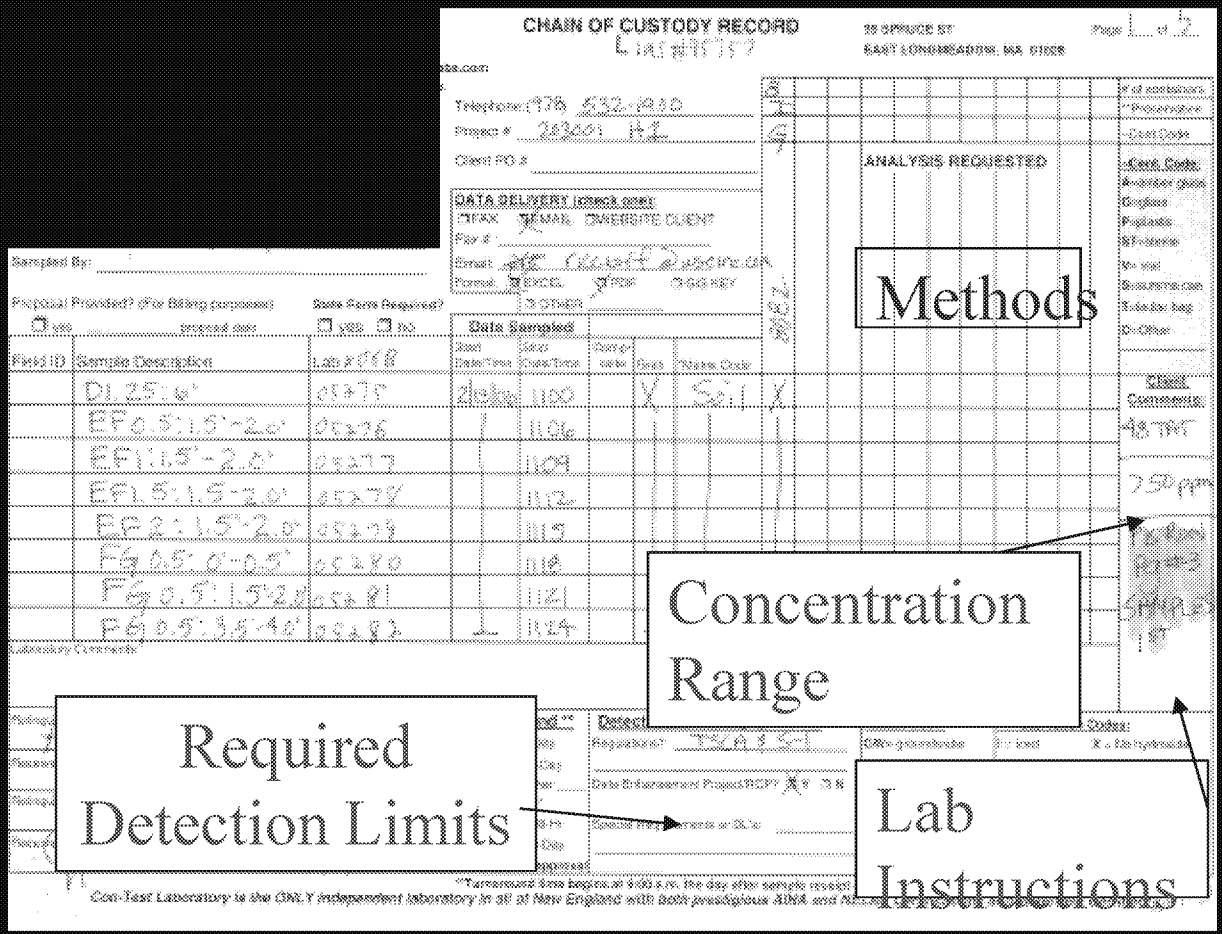
Incorrect / Incomplete COC Info.

1) Analytical and extraction requirements

2) Expected concentration range

3) Required reporting limits

4) Special Instructions



Activities to Date

- September 2009 caulk guidance - fact sheets, Q & A's, Schools Info Kit
- *Steps to Safe Renovation and Abatement of Buildings that have PCB-Containing Caulk*
- Developed public health levels for PCBs in indoor air for schools
- April 2010 – ANPR PCB Uses
- December 2010 (ballast guidance)
- Disaster Debris Guidance – June 2011
- *PCB bulk product waste* reinterpretation – October 24, 2012
- ORD Research – PCB mitigation and exposures assessment in buildings
- Ship Sampling Guidance - 2013
- Shredder Fluff – April 2013

http://www.epa.gov/epawaste/hazard/tsd/pcbs

Contacts and PCB Info

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- Caulk Hotline: 888-835-5372

- *http://www.epa.gov/epawaste/hazard/tsd/pcbs*

- *http://www.epa.gov/region1/cleanup/pcbs/index.htm*